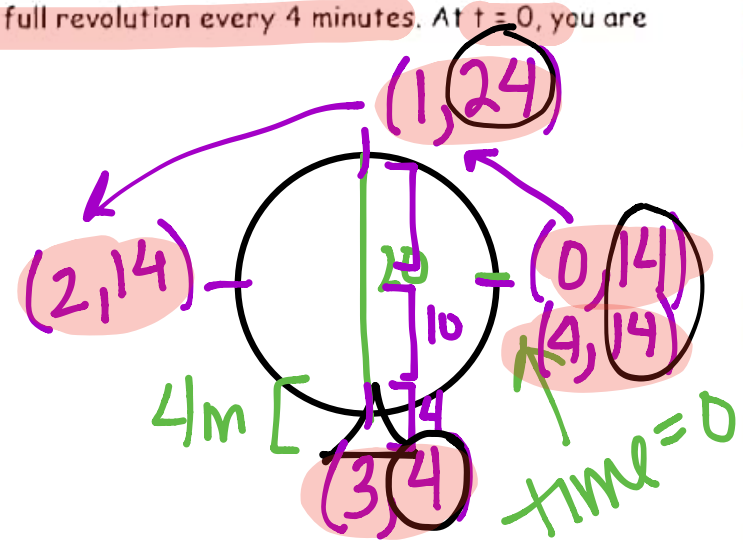
Day 8 Notes

AFM - Modeling a Ferris Wheel with Trig Functions Name:_____

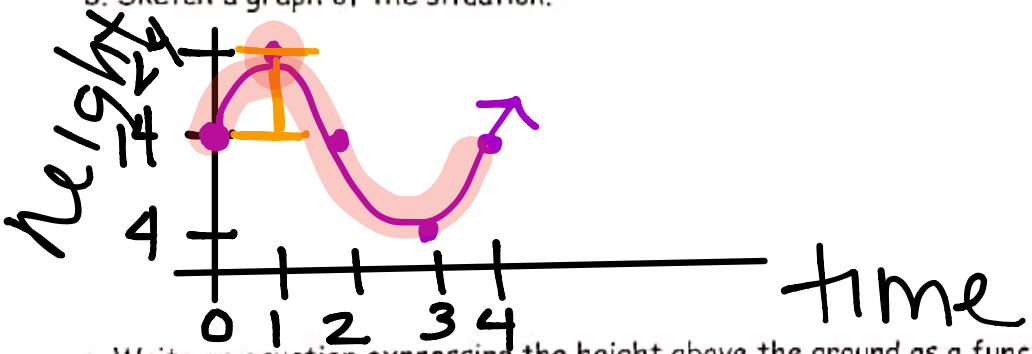
1. A ferris wheel is 20 meters in diameter and is boarded at the six o'clock position from a platform that is 4 meters above the ground. The wheel completes one full revolution every 4 minutes. At t = 0, you are in the 3 o'clock position and ascending.

a. Model the situation with a picture/diagram.

(time, height)



b. Sketch a graph of the situation.



c. Write an equation expressing the height above the ground as a function of time, t.

sine
midline @ y=14
Amp = 10
+14
$B = \frac{2\pi}{4} = \frac{\pi}{2}$

$y = 10\sin\left[\frac{\pi}{2}(x)\right] + 14$

d. Predict your height above the ground when you have been on the wheel for 6.5 minutes.

$y = 10\sin\left[\frac{\pi}{2}(6.5)\right] + 14 = 6.9\text{ m}$

x

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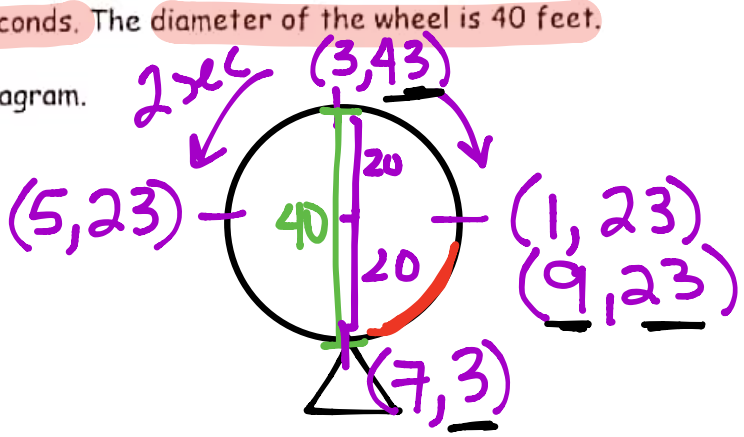
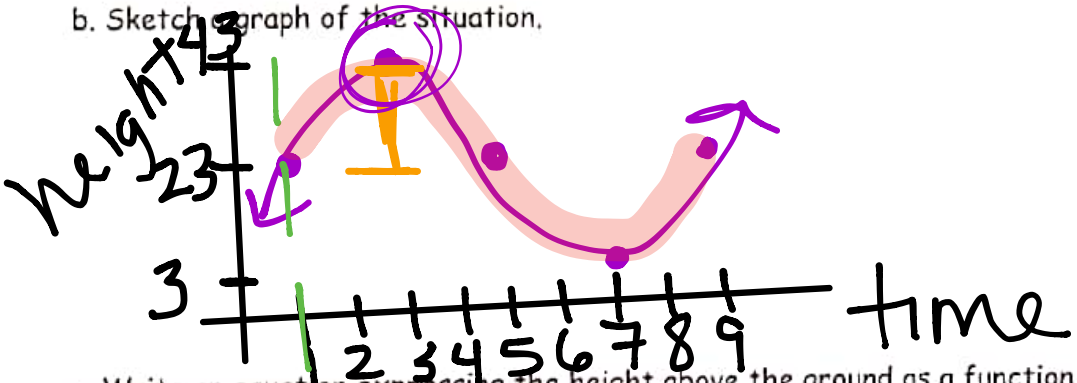
2. When you ride a ferris wheel, your distance from the ground varies sinusoidally with time. You find that it takes you 3 seconds to reach the top, which is 43 feet above the ground and that the wheel makes a complete revolution every 8 seconds. The diameter of the wheel is 40 feet.

a. Model the situation with a picture/diagram.

$\frac{8}{4} = 2$



b. Sketch a graph of the situation.



c. Write an equation expressing the height above the ground as a function of time, t.

$B = \frac{2\pi}{8} = \frac{\pi}{4}$

Sine
Amp = 20 phase shift = 1
midline @ y = 23 → vertical shift = 23

d. What is the lowest you go as the Ferris wheel turns, and why is this number greater than zero?

$y = 20\sin[\pi/4(x-1)] + 23$

e. Predict your height above ground when t = 6 seconds.

$y = 20\sin[\pi/4(6-1)] + 23 = 8.9\text{ ft}$

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